Subject: Re: CCD saturation
Posted by Marshall Perrin on Fri, 24 Oct 2008 22:23:15 GMT
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Wox <wout.de.nolf@gmail.com> wrote:
> Hi all,
>
> Does anyone have any experience in correcting images for saturation
> streaking? See image b in
> http://learn.hamamatsu.com/articles/images/bloomingfigure1.j pg
>
> I tried to do something with IDL's sobel+contour but it seems hard to
> preserve the spots without streaking while removing the saturated ones
> along with its stripes. Any ideas?

Shape detection is not the way to go here, versus detecting the level at which pixels saturate. There should be some characteristic number of counts per pixel below which you know data is not saturated.

Bear in mind there is no real way to do more than cosmetic corrections to such images. Whatever pixel values were originally 'underneath' the saturation streaks are now permanantly lost. So you can make a prettier picture if you want, but for quantitative photometry or other analysis you'll have to consider alternate approaches. In some cases, like for HST ACS, the total number of counts from a source is preserved, even as the light gets smeared out into the wrong pixels.

- Marshall

Subject: Re: CCD saturation
Posted by Wox on Sat, 25 Oct 2008 13:33:36 GMT
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Marshall Perrin wrote:

> Shape detection is not the way to go here, versus detecting the level
> at which pixels saturate. There should be some characteristic number of
> counts per pixel below which you know data is not saturated.

Yes, but this only works for the inner part of a saturated spot + streaks. The edges don't have a value of 65535 (it's a 16bit CCD camera) and can in fact have a lower value than non-saturated spots which I want to preserve. That's why I could only think of shape detection to differ streaks from spots. However I'm not really able to do that. I usually remove a lot of non-saturated spots too.

The problem I want to solve is illustrated here (X-ray Powder

Diffraction): http://www.datasqueezesoftware.com/screenbig.jpg
You see the so-called Debye rings in the image in the background and the azimuthally integrated pattern in the front. Usually you don't see this nice rings, but alot of spots forming a ring (or more rings). Imagine azimuthally integrating this when some spots are saturated with streaking. You don't end up with nice Gaussian peaks like in the figure, but some strange ..euhm.. things... that may look like peaks. If I could just detect the streaks and set these pixels to zero, I solved the problem.

Since there are alot of astronomers here, I would think they also have similar problems to solve, only their spots are not scattered X-ray beams but stars :-).

Subject: Re: CCD saturation
Posted by pgrigis on Mon, 27 Oct 2008 13:27:03 GMT
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Wox wrote:
> Marshall Perrin wrote:
>
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>> at which pixels saturate. There should be some characteristic number of
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> streaks. The edges don't have a value of 65535 (it's a 16bit CCD
> camera) and can in fact have a lower value than non-saturated spots
> which I want to preserve.

Does the CCD really behaves this way? Seems pretty bad if saturation is spread around that way... Are you sure it is not stray light?

Paolo

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> detection to differ streaks from spots. However I'm not really able to
> do that. I usually remove a lot of non-saturated spots too.
>
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> beams but stars :-).

Subject: Re: CCD saturation
Posted by JMB on Mon, 27 Oct 2008 16:47:06 GMT
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Hi Wox,

If you haven't solved your problem yet, here are some ideas to help:

- If your streaks are vertical, you can try to search for them in the columns of your image matrix.

First you need to identify a threshold to separate "active" pixels from noisy background:
e.g. T1 = mean(image) x 4,

Then look for columns that are corrupted by streaks:
for i=0,Ncols-1 do column[i]=total(img[i,*] gt T1)

You get for each column the number of "active" pixels and if this number is higher than a specific threshold this column contains a streak and you can set the pixels of this column equal to zero (or background value)

The problem is that by doing this you miss now the "good" pixels from the center of your active spot/star.
A way to retrieve the center of your bright spots without taking the streak is to use the median function:
e.g. median(img,5) GT T2
where T2 is a threshold on the image brigthness.
You can visualize the result of the median function by typing:
tvscl, median(img,5) GT T2 ; 0 < T2 < 255 for 8 bit images.
Playing around with the size of the median filter and the value of T2, you may be able to create a mask that filter out the streaks and let you only the large spots.

If it doesn't seem clear, please ask

Jérôme
